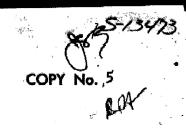
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PHOTOGRAPHIC INTELLIGENCE MEMORANDUM

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OP/I - 223

19 November 1956

Declassification Review By NIMA / DoD

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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This memorandum reports the	completion of Division participation
in Project 70.219	undertaken in response to a request
from of SR/10/DD/P.	The project was concerned with
spectrographic analysis of smoke	in an attempt to determine the types
of industrial processes involved	in industrial plants.

Two methods of investigation were considered. The first of these would consist of an attempt to produce a "key" to smokes using color photography. This key would permit the identification of industrial activities through comparative spectrographic analysis. The second possible solution lay in the modification of spectrographic analysis techniques to suit the limited space practical for covert collection.

Conversations with personnel of TES/AFD indicate that there has been considerable work done by various sources in the field of colored photographic keys. None of these efforts to date have had any marked success due to the widely varying color renditions of color emulsions under differing light conditions. The second of the possible solutions to the problem seemed to offer the most hope for successful technique. It was proposed that a device be constructed that would approximate a conventional camera in size and configuration. Such a device would include two optical trains utilizing a lens and prism arrangement with shutters. One train would record, on a spectrographic emulsion,

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the spectro display of the ambient light (skylight); the second optical train would record the spectrographic signature of the unidentified smoke. A comparative study of the two spectrographic files would then identify the chemical gains or losses in the smoke.

Consultation between personnel of this office and spectrographic specialists in the Bureau of Standards indicated that any attempt at a spectrographic solution to the requirements would need such massive equipment as to negate its clandestine use. The proposal as indicated above would not have inherent in it sufficient intensity of light to permit a sharply defined spectrographic image.

The use of color film in conjunction with a color "key" to industrial smokes is the only approach that still offers hope of success. The problems to such an approach are many. The variations in color rendition between different color emulsions, the varying response of color films to differing light temperatures, and the relatively narrow spectral band that will yield data, all present serious problems in the development of a suitable technique.

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the investigations undertaken by this office and has provided advice on methods of investigation. TSS/AFD now is ready to continue research on the problem, through means of an external research project, if the requester so desires. The Division plans no further effort on the problem and considers the project closed.

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